



14
REC'D 11 DEC 2001

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2846/0003		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA00/00966	International filing date (day/month/year) 18/08/2000	Priority date (day/month/year) 19/08/1999	
International Patent Classification (IPC) or national classification and IPC C12N15/52			
Applicant GORING, Daphne et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none">I <input checked="" type="checkbox"/> Basis of the reportII <input type="checkbox"/> PriorityIII <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicabilityIV <input type="checkbox"/> Lack of unity of inventionV <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statementVI <input type="checkbox"/> Certain documents citedVII <input type="checkbox"/> Certain defects in the international applicationVIII <input checked="" type="checkbox"/> Certain observations on the international application			
Date of submission of the demand 16/03/2001		Date of completion of this report 07.12.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Burkhardt, P Telephone No. +49 89 2399 7456 	

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/CA00/00966

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-56 as originally filed

Claims, No.:

1-47 as originally filed

Drawings, sheets:

1/21-21/21 as originally filed

Sequence listing part of the description, pages:

1-29, filed with the letter of 4.12.2000

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☒ furnished subsequently to this Authority in written form.
- ☒ furnished subsequently to this Authority in computer readable form.
- ☒ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☒ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/CA00/00966

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	11 - 13, 23 - 27, 32, 41, 42, 45 and 46
	No:	Claims	1 - 10, 14 - 22, 28 - 31, 33 - 40, 43, 44 and 47
Inventive step (IS)	Yes:	Claims	
	No:	Claims	11 - 13, 23 - 27, 32, 41, 42, 45 and 46
Industrial applicability (IA)	Yes:	Claims	1 - 47
	No:	Claims	

**2. Citations and explanations
see separate sheet**

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement of invention

1.1 The applicants have isolated and sequenced a *Brassica* polynucleotide which has a certain identity to known protein kinases from *Arabidopsis* and to plant extensins. The analysis of the postulated cell wall-associated receptor kinase function is not provided. Experimental data supporting the function are not part of the application.

2. Article 33(2) PCT (Novelty)

The following documents (D) are referred to in this communication; the numbering will be adhered to in the rest of the procedure and is following the order of the International Search Report:

- D1 EMBL Online AC Q9ZNQ8
- D2 EMBL Online AC O65672
- D3 EMBL Online AC Q9ZUE0
- D4 WO-A-9409139 (University of Guelph)

2.1 Present claim 1 is directed to an isolated nucleic acid molecule encoding a proline-rich, extensin-like receptor kinase.

Prior art documents D1 - D3 all disclose *Arabidopsis* kinases that fall within the scope of present claim 1. Claim 1 does not meet the requirements of Article 33(2) PCT. The same holds true for dependent claims 2 - 7 as well as for claims 8 - 10, 14 - 22, 28 - 31, 33 - 40, 43, 44 and 47 relating to the corresponding protein, recombinant DNA constructs and transgenic cells containing said nucleic acid molecule.

3. Article 33(3) PCT (Inventive step)

3.1 Nucleic acid molecules encoding proline-rich, extensin-like receptor kinases from *Brassica* species may be novel but do not involve an inventive step.

As already laid out in paragraph 2.1, kinases from *Arabidopsis* were known in the prior art.

The problem to be solved may thus be formulated as the provision of alternative kinases. Isolating orthologues from closely related plant species must, in view of the high homology within the *Brassicaceae* family, be considered only as routine matter. In the absence of any surprising or advantageous properties involved with the claimed specific DNA sequence, inventive activity of the claimed matter cannot be acknowledged. Thus, claims 12 and 13 do not meet the requirements of Article 33(3) PCT. The same holds true for present claims 41 and 42 relating to the corresponding proteins as well as for claims 45 and 46 directed to antibodies against said polypeptides.

3.2 Transforming plants with known sequences does not involve an inventive step. Plant transformation techniques were readily available at the filing date of the present application and would have been used by the man skilled in the art according to his needs. Claims 23 - 27 do therefore not meet the requirements of Article 33(3) PCT.

3.3 Present claims 11 and 32 are directed to a defined *Brassica* sequence. As already laid out above, no functional analysis was provided.

Nucleotide sequences from *Brassica* are known in the prior art. The technical problem may thus be formulated as the provision of further nucleotide sequences from *Brassica*.

3.4 An arbitrary choice of a nucleotide sequence from *Brassica* cannot involve an inventive step. In order to be patentable, a selection must not be arbitrary but must be justified by the technical purpose, i.e. by a hitherto unknown or unexpected technical effect which is caused by those structural features distinguishing the nucleotide sequence from the numerous other ones. However, this is not the case for SEQ ID NO:1 or 2, respectively. Therefore, present claims 11 and 32 do not meet the requirements Article 33(3) PCT.

Re Item VIII

Certain observations on the international application

1. The subject-matter of present claim 1 is the generalisation of a specific finding of the applicant, i.e. a cell wall-associated protein kinase. Such generalisation, however, is only allowable if the invention opens up a whole new field (PCT Guidelines C-III, 6.2) which does not seem to be the case here (see above). Furthermore, a lack of support (Article 5 PCT) arises as the description does not teach how to isolate all the other cell wall-associated protein kinases based on the disclosed *Brassica* sequences.
2. Claim 1 does not meet the requirements of Article 6 PCT. None of the terms "proline-rich" or "extensin-like" constitutes a definition in terms of technical features as required by Rule 6.3(a) PCT. Both terms are undefined and do not allow to determine the extent of protection.
The only term that is likely to be a technical feature is "receptor kinase" and thus all prior art documents relating to plant receptor kinases would anticipate the subject-matter of present claim 1.
3. The terms "fragment of " and "parts of " throughout the claims appear to be unclear (Article 6 PCT). It is not apparent what such fragments or parts may comprise and thus an undue burden is placed on others seeking to establish the extent of the protection.

INTERNATIONAL SEARCH REPORT

Inter Application No
PCT/CA 00/00966

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/52 C07K14/415 C12N15/82 C07K16/16 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N C07K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, EMBL, BIOSIS, CHEM ABS Data, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE EMBL AC Q9ZNQ8 'Online! Putative serine/threonine protein kinase, 1 May 1999 (1999-05-01) LIN ET AL.: "Arabidopsis chromosome II BAC T30D6 genomic sequence" XP002157873 abstract	1-10, 12-31, 33-47
X	DATABASE EMBL 'Online! AC 065672, putative protein kinase, 1 August 1998 (1998-08-01) TERRY ET AL.: "Serine/Threonine protein kinase" XP002157874 cited in the application abstract	1-10, 12-31, 33-47
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

19 January 2001

Date of mailing of the international search report

06/02/2001

Name and mailing address of the ISA

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NL - 2280 HV Rijswijk
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Fax: (+31-70) 340-3016

Authorized officer

Burkhardt, P

INTERNATIONAL SEARCH REPORT

Inter Application No
PCT/CA 00/00966

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE EMBL 'Online! AC Q9ZUE0, 1 May 1999 (1999-05-01) VYSOTSKAIA ET AL.: "Arabidopsis thaliana chromosome 1 BAC F508 sequence" XP002157875 cited in the application abstract</p> <p style="text-align: center;">---</p>	<p>1-10, 12-31, 33-47</p>
A	<p>WO 94 09139 A (UNIV GUELPH ;PIONEER HI BRED INT (US)) 28 April 1994 (1994-04-28) the whole document</p> <p style="text-align: center;">---</p>	<p>1</p>
P,X	<p>DATABASE EMBL AC Q9XI96 'Online! Sim. to som. embryogen. receptor-like kinase, 1 November 1999 (1999-11-01) FEDERSPIEL ET AL.: "Sequence from N.A." XP002157876 abstract</p> <p style="text-align: center;">-----</p>	<p>1-10, 12-31, 33-47</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter Application No

PCT/CA 00/00966

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9409139 A	28-04-1994	AU 5298593 A US 5821094 A	09-05-1994 13-10-1998

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 March 2001 (01.03.2001)

PCT

(10) International Publication Number
WO 01/14563 A1

(51) International Patent Classification⁷: C12N 15/52,
C07K 14/415, C12N 15/82, C07K 16/16, A01H 5/00

(21) International Application Number: PCT/CA00/00966

(22) International Filing Date: 18 August 2000 (18.08.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/149,466 19 August 1999 (19.08.1999) US
60/159,122 13 October 1999 (13.10.1999) US

(71) Applicants and

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(74) Agent: DEETH WILLIAMS WALL LLP; National
Bank Building, Suite 400, 150 York Street, Toronto,
Ontario M5H 3S5 (CA).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,
DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

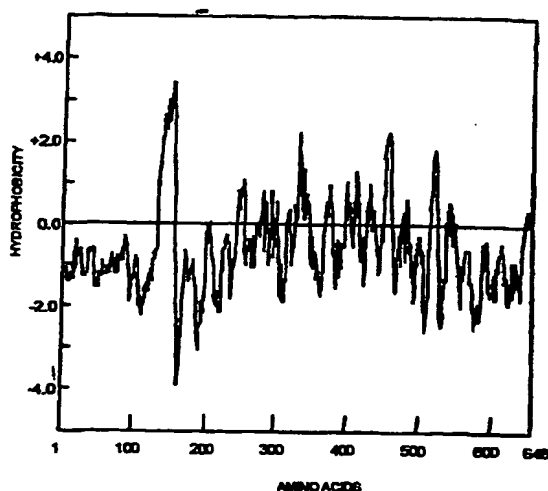
(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

- With international search report.
- Before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments.

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: PROLINE-RICH EXTENSIN-LIKE RECEPTOR KINASES



(57) Abstract: The invention includes PERK (Proline-rich Extensin-like Receptor Kinase) nucleic acid molecules and polypeptides. A receptor-like protein kinase designated PERK1 (Proline-rich Extension-like Receptor Kinase 1) was isolated from an 8-pistil cDNA library of *Brassica napus*. The deduced PERK1 protein is comprised of a cytoplasmic domain that contains all of the conserved amino acids prevalent among serine/threonine kinases, a transmembrane domain and an extracellular domain with sequence similarity to the extensin family of plant cell wall proteins. Northern blot analysis demonstrated that PERK1 mRNA accumulated rapidly in leaf and stem tissue of *B. napus* in response to wounding and treatment with salicylic acid. In contrast, no significant accumulation of PERK1 mRNA was detected following treatment with methyl jasmonate. The rapidity of PERK1 mRNA accumulation in response to these treatments shows a role in plant defense signaling.

WO 01/14563 A1

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/00966

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/52 C07K14/415 C12N15/82 C07K16/16 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N C07K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, EMBL, BIOSIS, CHEM ABS Data, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- *G* document member of the same patent family

Date of the actual completion of the international search

19 January 2001

Date of mailing of the international search report

06/02/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
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Fax: (+31-70) 340-3016

Authorized officer

Burkhardt, P

INTERNATIONAL SEARCH REPORT

Inter national Application No

PCT/CA 00/00966

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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P,X	DATABASE EMBL AC Q9XI96 'Online! Sim. to som. embryogen. receptor-like kinase, 1 November 1999 (1999-11-01) FEDERSPIEL ET AL.: "Sequence from N.A." XP002157876 abstract	1-10, 12-31, 33-47

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 00/00966

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 2846/0003	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/CA 00/ 00966	International filing date (day/month/year) 18/08/2000	(Earliest) Priority Date (day/month/year) 19/08/1999
Applicant GORING, Daphne et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

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☒ furnished subsequently to this Authority in computer readable form.

☒ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☒ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

CA 00/00966

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/52 C07K14/415 C12N15/82 C07K16/16 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N C07K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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X	<p>DATABASE EMBL 'Online! AC 065672, putative protein kinase, 1 August 1998 (1998-08-01) TERRY ET AL.: "Serine/Threonine protein kinase" XP002157874 cited in the application abstract</p> <p>---</p> <p style="text-align: center;">-/--</p>	1-10, 12-31, 33-47

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- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

19 January 2001

Date of mailing of the international search report

06/02/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
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Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Burkhardt, P

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE EMBL 'Online! AC Q9ZUE0, 1 May 1999 (1999-05-01) VYSOTSKAIA ET AL.: "Arabidopsis thaliana chromosome 1 BAC F508 sequence" XP002157875 cited in the application abstract	1-10, 12-31, 33-47
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Information on patent family members

CA 00/00966

Form PCT/ISA/210 (patent family annex) (July 1992)

ID Q9ZNQ8 PRELIMINARY; PRT; 633 AA.
AC Q9ZNQ8;
DT 01-MAY-1999 (TrEMBLrel. 10, Created)
DT 01-MAY-1999 (TrEMBLrel. 10, Last sequence update)
DT 01-JUN-2000 (TrEMBLrel. 14, Last annotation update)
DE PUTATIVE SERINE/THREONINE PROTEIN KINASE.
GN F24H14.18.
OS Arabidopsis thaliana (Mouse-ear cress).
OC Eukaryota; Viridiplantae; Embryophyta; Tracheophyta; Spermatophyta;
OC Magnoliophyta; eudicotyledons; core eudicots; Rosidae; eurosids II;
OC Brassicales; Brassicaceae; Arabidopsis.
OX NCBI_TaxID=3702;
RN [1]
RP SEQUENCE FROM N.A.
RC STRAIN=CV. COLUMBIA;
RA Lin X., Kaul S., Shea T.P., Fujii C.Y., Shen M., VanAken S.E.,
RA Barnstead M.E., Mason T.M., Bowman C.L., Ronning C.M., Benito M.,
RA Carrera A.J., Creasy T.H., Buell C.R., Town C.D., Nierman W.C.,
RA Fraser C.M., Venter J.C.;
RT "Arabidopsis thaliana chromosome II BAC T30D6 genomic sequence.";
RL Submitted (FEB-1999) to the EMBL/GenBank/DDBJ databases.
DR EMBL; AC006135; AAD12219.1; -.
DR INTERPRO; IPR000719; -.
DR INTERPRO; IPR002290; -.
DR INTERPRO; IPR002965; -.
DR PFAM; PF00069; pkinase; 1.
DR PRINTS; PR01217; PRICHEXTENSIN.
DR PROSITE; PS00107; PROTEIN_KINASE_ATP; 1.
DR PROSITE; PS00108; PROTEIN_KINASE_ST; 1.
DR PROSITE; PS50011; PROTEIN_KINASE_DOM; 1.
KW Kinase; Serine/threonine-protein kinase; Hypothetical protein.
SQ SEQUENCE 633 AA; 66651 MW; AE92060E5493C846 CRC64;
MASSPESAPP TNSTSSPSPP SNTNSTTSSP PAPSPPSPTP PQGDSSTSSPP PDSTSPAPQ
APNPPNSSNN SPSPPSQGGG GERGNNGGNG GNDTPPSRGS PPSPPSRSG DNGGSRSSPP
GDTGGSRSND PPSSGGSSGG GGGGRSNTNT AIIVGVLVGA GLLMIVLIIV CLRRKKKRKD
SFYPEPMKGN QYQYYGNNNN NNASQNYPNW HLNSQGQNNQ STGGWGGGGP SPPPPPRMPT
SGEDSSMYSG PSRPVLPPPS PALALGFNKS TPTYQELAAA TGGFTDANLL GQGGFGYVHK
GVLP SGKEVA VKSLKAGSGQ GEREFOAEVD IISRVHHRYL VSLVGYCIAD GQRM LVYEFV
PNKTLEYHLH GKNLPVMEFS TRLRIALGAA KGLAYLHEDC HPRIIHRDIK SANILLDFNF
DAMVADFGLA KLTSDNNTHV STRVMGTFGY LAPEYASSGK LTEKSDVFSY GVMLLELITG
KRPVDNSITM DDTLVDWARP LMARALEDN FNELADARLE GNYPNQEMAR MVTCAAASIR
HSGRKRPKMS QIVRALEGEV SLDALNEGVK PGHSNVYGS L GASSDYSQTS YNADMKKFRQ
IALSSQEFV SDCEGTSSND SRDMGTSPT PPK

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SPTREMBL:O65672

XP_02157874

ID O65672 PRELIMINARY; PRT; 674 AA.
 AC O65672;
 DT 01-AUG-1998 (TrEMBLrel. 07, Created)
 DT 01-NOV-1998 (TrEMBLrel. 08, Last sequence update)
 DT 01-OCT-2000 (TrEMBLrel. 15, Last annotation update)
 DE PUTATIVE SERINE/THREONINE PROTEIN KINASE.
 GN T4L20.20 OR AT4G34440.
 OS Arabidopsis thaliana (Mouse-ear cress).
 OC Eukaryota; Viridiplantae; Embryophyta; Tracheophyta; Spermatophyta;
 OC Magnoliophyta; eudicotyledons; core eudicots; Rosidae; eurosids II;
 OC Brassicales; Brassicaceae; Arabidopsis.
 OX NCBI_TaxID=3702;
 RN [1]
 RP SEQUENCE FROM N.A.
 RA Terryn N., Ardiles W., Buysshaert C., Dasseville R., De Clerck R.,
 RA De Keyser A., Neyt P., Rouze P., Van Den Daele H., Villaroel R.,
 RA Gielen J., van Montagu M., Hoheisel J., Jesse T., Heijnen L., Vos P.,
 RA Mewes H.W., Mayer K.F.X., Schueller C., Bevan M.;
 RL Submitted (APR-1998) to the EMBL/GenBank/DBJ databases.
 RN [2]
 RP SEQUENCE FROM N.A.
 RA Terryn N., Ardiles W., Buysshaert C., Dasseville R., De Clerck R.,
 RA De Keyser A., Neyt P., Rouze P., Van Den Daele H., Villaroel R.,
 RA Gielen J., Van Montagu M., Mewes H.W., Lemcke K., Mayer K.F.X.;
 RL Submitted (MAR-2000) to the EMBL/GenBank/DBJ databases.
 RN [3]
 RP SEQUENCE FROM N.A.
 RA EU Arabidopsis sequencing project;
 RL Submitted (MAR-2000) to the EMBL/GenBank/DBJ databases.
 DR EMBL; AL023094; CAA18823.1; -.
 DR EMBL; AL161585; CAB80161.1; -.
 DR MENDEL; 29838; Arath;1197;29838.
 DR INTERPRO; IPR000719; -.
 DR INTERPRO; IPR002290; -.
 DR PFAM; PF00069; pkinase; 1.
 DR PROSITE; PS00107; PROTEIN_KINASE_ATP; 1.
 DR PROSITE; PS00108; PROTEIN_KINASE_ST; 1.
 DR PROSITE; PS50011; PROTEIN_KINASE_DOM; 1.
 KW Serine/threonine-protein kinase; Kinase.
 SQ SEQUENCE 674 AA; 71595 MW; 512446A104FE3B3E CRC64;
 MADSPVDSSP APETSNGTTP SNGTSPSNES SPPTPPSSPP PSSISAPPPD ISASFSPPPA
 PPTQETSPPT SPSSSPVVA NPSPQTPENP SPPAPEGSTP VTPPAPPQTP SNQSPERPTP
 PSPGANDDRN RTNGGNNNRD GSTPSPSSG NRTSGDGGSP SPPRSISPPQ NSGSDSDSSG
 LLLLAVCIC ICCNRKKKK SPQVNHMHYY NNNPYGGAPS GNGGYKGTQ QDHVVMAGQ
 GGGNWGPQOP VSGPHSDASN LTGRTAIPSP QAATLGHNS TTTYDELSIA TEGFAQSNLL
 QGGGFGYVHK GVLPKGKEVA VKSLKLGSG GEREFAQEVD IISRVHHRHL VSLVGYCISG
 GQRLLVYEFI PNNTLEFHLH GKGRPVLDWP TRVKIALGSA RGLAYLHEDC KKIFISHICI
 SHPRIIHRDI KANILLDFS FETKVADFGL AKLSQDNYTH VSTRVMGTFG YLAPEYASSG
 KLSKSDVFS FGVMLLELIT GRPPLDLTGE MEDSLVDWAR PLCLKAAQDG DYNQLADPRL
 ELNYSHQEMV QMASCAAAAI RHSARRRPKM SQVQKLIPLV GSIIIVRALEG DMSMDDLSEG
 TRPGQSTYLS PGVSSEYDA SSYTADMKKF KKLALENKEY QSSEYGGTSE YGLNPSASSS
 EEMNRGSMKR NPQL

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SPTREMBL:Q9ZUE0

XP_002157875

ID Q9ZUE0 PRELIMINARY; PRT; 731 AA.
 AC Q9ZUE0;
 DT 01-MAY-1999 (TrEMBLrel. 10, Created)
 DT 01-MAY-1999 (TrEMBLrel. 10, Last sequence update)
 DT 01-OCT-2000 (TrEMBLrel. 15, Last annotation update)
 DE HYPOTHETICAL 77.6 KDA PROTEIN F508.10.
 GN F508.10.
 OS Arabidopsis thaliana (Mouse-ear cress).
 OC Eukaryota; Viridiplantae; Embryophyta; Tracheophyta; Spermatophyta;
 OC Magnoliophyta; eudicotyledons; core eudicots; Rosidae; eurosids II;
 OC Brassicales; Brassicaceae; Arabidopsis.
 OX NCBI_TaxID=3702;
 RN [1]
 RP SEQUENCE FROM N.A.
 RC STRAIN=CV. COLUMBIA;
 RA Vysotskaia V.S., Schwartz J.R., Yu G., Toriumi M., Liu S., Lenz C.,
 RA Li J., Kremenetskaia I., Luros J., Altafi H., Gonzalez A., Araujo R.,
 RA Buehler E., Conn L., Conway A.B., Dunn P., Hansen N., Huizar L.,
 RA Kim C., Palm C.J., Rowley D., Shinn P., Walker M., Davis R.W.,
 RA Ecker J.R., Federspiel N.A., Theologis A.;
 RT "Arabidopsis thaliana chromosome 1 BAC F508 sequence."
 RL Submitted (NOV-1998) to the EMBL/GenBank/DDBJ databases.
 RN [2]
 RP SEQUENCE FROM N.A.
 RC STRAIN=CV. COLUMBIA;
 RA Theologis A.;
 RL Submitted (DEC-1998) to the EMBL/GenBank/DDBJ databases.
 DR EMBL; AC005990; AAC98010.1; -.
 DR HSSP; P06239; 3LCK.
 DR INTERPRO; IPR000719; -.
 DR INTERPRO; IPR002290; -.
 DR INTERPRO; IPR002965; -.
 DR PFAM; PF00069; pkinase; 1.
 DR PRINTS; PR01217; PRICHEXTENSIN.
 DR PROSITE; PS00107; PROTEIN_KINASE_ATP; 1.
 DR PROSITE; PS00108; PROTEIN_KINASE_ST; 1.
 DR PROSITE; PS50011; PROTEIN_KINASE_DOM; 1.
 KW Hypothetical protein.
 SQ SEQUENCE 731 AA; 77638 MW; 45D93AD5C450001B CRC64;
 MSDLGESPSS SPPAPPADTA PPPETPSENS ALPPVDSSPP SPPADSSSTP PLSEPSTPPP
 DSQLPPLPSI LPPLTDSPPP PSDSSPPVDS TPSPPPPTSN ESPSPPEDSE TPPAPPNESN
 DNNPPPSQDL QSPPPSSPSP NVGPTNPESP PLQSPAPPAS SDPTNSPPAS PLDPTNPPPI
 QPSGPATSPP ANPNAPPSPF PTVPPKTPSS GPVVSPSLTS PSKGTPTPNQ GNGDGGGGGG
 GYQKTMVGM AVAGFAIMAL IGVVFLVRRK KKRNIDSYNH SQYLPHPNFS VKSDGFLYGQ
 DPGKGYSSGP NGSMYNNSSQ QQSSMGNSYG TAGGGYPHHQ MQSSGTPDSA ILGSGQTHFS
 YEELAEITQG FARKNILGEG GFGCVYKGTI QDGKVVAVKQ LKAGSGQGDR EFKAEEVEIIS
 RVHHRHLVSL VGYCISDQHR LLIYEYVSNO TLEHHLHEWS KRVRIAIGSA KGLAYLHEDC
 HPKIIHRDIK SANILLDDEY EAQAIMKSSF SLNLSYDCKV LVADFGGLARL NDTTQTHVST
 RVMGTFGYLA PEYASSGKLT DRSDVFSFGV VLLELVTGRK PVDQTQPLGE ESLVEWARPL
 LLKAIETGDL SELIDTRLEK RYVEHEVFRM IETAAACVRH SGPKRPRMVQ VVRALDCDGD
 SGDISNGIKI GQSTTYDSGQ YNEDIMKFRK MAFGGDNSVE SGLYSGNYSK KSSSDFSGNE
 SETRPFNNRR F

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SPTREMBL:Q9XI96

XP_02157876

ID Q9XI96 PRELIMINARY; PRT; 699 AA.
 AC Q9XI96;
 DT 01-NOV-1999 (TrEMBLrel. 12, Created)
 DT 01-NOV-1999 (TrEMBLrel. 12, Last sequence update)
 DT 01-OCT-2000 (TrEMBLrel. 15, Last annotation update)
 DE SIMILAR TO SOMATIC EMBRYOGENESIS RECEPTOR-LIKE KINASE.
 GN F13F21.28.
 OS Arabidopsis thaliana (Mouse-ear cress).
 OC Eukaryota; Viridiplantae; Embryophyta; Tracheophyta; Spermatophyta;
 OC Magnoliophyta; eudicotyledons; core eudicots; Rosidae; eurosids II;
 OC Brassicales; Brassicaceae; Arabidopsis.
 OX NCBI_TaxID=3702;
 RN [1]
 RP SEQUENCE FROM N.A.
 RA Federspiel N.A., Palm C.J., Conway A.B., Conn L., Hansen N.F.,
 RA Altafi H., Araujo R., Huizar L., Rowley D., Buehler E., Dunn P.,
 RA Gonzalez A., Kremenetskaia I., Kim C., Lenz C., Li J., Liu S.,
 RA Luros S., Schwartz J., Shinn P., Toriumi M., Vysotskaia V.S.,
 RA Walker M., Yu G., Ecker J., Theologis A., Davis R.W.;
 RL Submitted (JUL-1999) to the EMBL/GenBank/DDBJ databases.
 DR EMBL; AC007504; AAD43169.1; -.
 DR HSSP; P06239; 3LCK.
 DR INTERPRO; IPR000719; -.
 DR INTERPRO; IPR002290; -.
 DR INTERPRO; IPR002965; -.
 DR PFAM; PF00069; pkinase; 1.
 DR PRINTS; PR01217; PRICHEXTENSN.
 DR PROSITE; PS00107; PROTEIN_KINASE_ATP; 1.
 DR PROSITE; PS00108; PROTEIN_KINASE_ST; 1.
 DR PROSITE; PS50011; PROTEIN_KINASE_DOM; 1.
 KW Receptor; Kinase.
 SQ SEQUENCE 699 AA; 74328 MW; 97564B8A6389B0BE CRC64;
 MAEQQSPENS PPAPPPSP SPPSSNDQQT TSPPPSDNQE TTSPPPSPSSP DIAPPPQQQQ
 ESPPPLPEN SSDGSSSSSP PPPSDSSSQS QSPPPSTSP PQQSDNNGNK GNMNENNKGN
 DGSSGDGKNK NMSHTPPPS KTS DHSSHSQ PRSLAPPTSN SGSNSSSNDG LNIGAVIGLV
 AAAGILFIVM ILLCVCCFRK KKKKSKLDQM PYYGSNAYPA GKTGGDQYYN QNAATQQQQH
 YNQNDHIVNL PPPPGSMGTN WVSSPPPPPP GNWQPMPSPP APVSGGANVI QSGEMSSNFS
 SGPYAPSLPP PHPSVALGFN NSTFTYEELA SATQGFSKDR LLGQGGFGYV HKGILPNGKE
 IAVKSLKAGS GQGEREFQAE VEIISR VHHR HLVSLVGYCS NAGGQRLLVY EFLPNDTLEF
 HLHGKSGTVM DWPTRLKIAL GSAKGLAYLH EDCHPKIIHR DIKASNILLD HNFEAKVADF
 GLAKLSQDNN THVSTRVMGT FGYLAPAYAS SGKLTEKSDV FSFGVMLLEL ITGRGPVDLS
 GDMEDSLVDW ARPLCMRVAQ DGEYGELVDP FLEHQYEPYE MARMVACAAA AVRHSGRRRP
 KMSQIVRTLE GDASLDDDD GVKPKQSSSG GEGSSDYEMG TYGAEMRKFR KVTLESRDYG
 ASSEYGATSE YGLDPSSSSS EEMHIGGSTS KTTTTNRGI

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